



Assessing and reducing the risk of ground-water contamination from

Pasture and Riparian Management

(small ranchette-type operation)

Worksheet 12

Keeping Idaho's Water Clean

Why should I be concerned?

Pastures and riparian areas are critical components of watersheds. Their management can have a tremendous effect on the quality of water and habitat in watersheds. Sediment, bacteria, nutrients, and temperature are the water quality parameters that are influenced by pasture and riparian area management. Improper animal grazing management practices can lead to poor water quality and habitat in streams and lakes.

Excess sediment can cover spawning and resident fish sanctuaries making them unusable. It carries nutrients which can lead to the eutrophication of lakes and will also eventually fill lake systems shortening their useful life.

Excess bacteria renders streams and lakes unfit for recreational uses such as swimming, water skiing, and wading. Nutrients can lead to excessive aquatic plant growth in streams and lakes, as well as excessive algae production and accelerated eutrophication in lakes. High temperatures are not desirable for cold water species of fish such as trout. Not only do they prefer cool water, but oxygen levels may be decreased as a result of increased temperatures.

The goal of Home*A*Syst is to help you protect the environment and your drinking water.

How will these materials help me to protect my riparian areas?

- It will take you step-by-step through your animal pasture and riparian management practices.
- It will rank your activities according to how they might affect the ground water that provides your drinking water supply.
- It will provide you with easy-to-understand rankings that will help you analyze the "risk level" of your animal pasture and riparian management practices.
- It will help you determine which of your practices are reasonably safe and effective, and which ones might require modification to better protect your drinking water.

How do I complete the worksheet?

Follow the directions at the top of the chart on page 8. It should take you about 15 to 30 minutes to complete the worksheet and summarize your risk rankings.

Information derived from Home*A*Syst worksheets is intended only to provide general information and recommendations to rural residents regarding their own homestead practices. It is not the intent of this educational program to keep records of individual results.

Glossary

Pasture and Riparian Management

These terms may help you make more accurate assessments when completing Fact/Worksheet 12. They may also help clarify some of the terms used.

Available water capacity: The capacity of the soil to store water available for plant use, usually expressed in linear depths of water per unit depth of soil. Commonly defined as the difference between the percentage of soil water at field capacity and the percentage at wilting point.

Eutrophication: A means of aging of lakes whereby aquatic plants are abundant and waters are deficient in oxygen. The process is usually accelerated by enrichment of waters with surface runoff containing nitrogen and phosphorus.

Evaporation: The act or process by which a liquid is converted or changed into a vapor.

Evapotranspiration: Loss of water from the soil both by evaporation and by transpiration from the plants in the soil.

Field capacity: The percentage of water remaining in a soil two or three days after having been saturated and after free drainage has practically ceased.

Ground-water recharge: The addition of water to the saturated zone in a ground-water system.

Infiltration rate: A soil characteristic determining or describing the maximim rate at which water can enter soil under specified conditions, including the presence of an excess of water. Soils having clayey surface textures would have a slow rate whereas those having sandy surface textures would have a high infiltration rate.

Irrigation water management: The use and management of irrigation water where the quantity of water used for each irrigation is determined by the available water capacity of the soil and need for the crop, and where the water is applied at a rate and in such a manner that the crop can use it efficiently and significant erosion does not occur.

Percolation (soil water): The downward movement of water through the soil. Water would move slowly through clayey soils and quickly through sandy soils.

Riparian area: Areas adjacent to creeks, streams, and rivers where vegetation is strongly influenced by the presence of water.

Transpiration: The act or process whereby plants and animals give off vapor, containing waste products, through the pores of the skin or the stomata of plant tissue.

Wilting point: The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower plants) wilt and fail to recover their turgidity when placed in a dark humid atmosphere.



Improving Pasture and Riparian Management

Keeping Idaho's

Water Clean

Over the past several years, there has been a migration from city residential single family living to homes on small acreages. This fact sheet will address conservation and pollution prevention measures which can be incorporated to protect pastures and riparian areas up to twenty acres in size. The need for this type of information has been clearly demonstrated in the Cascade Reservoir watershed improvement project. Owners of these small ranchettes are concerned about what they can do to help with the restoration of the watershed. Improper grazing management of pasture and riparian areas by small ranchettes can lead to pollutants such as sediment, nutrients, and bacteria entering streams. Individually, their contribution may seem small, but as the numbers of small ranchettes increase, the potential for pollutant input on a watershed scale becomes more real. This fact sheet will provide the information these landowners should consider to become a part of the solution to improve water quality.

This fact sheet is intended for use on small ranchette type operations throughout the State of Idaho. An example of the target lies within Valley County, where 65 percent of the counties' 7,000 housing units are outside city limits. An estimated 30 percent, or approximately 1,365 of these units can be characterized as ranchette dwellings (1994 Valley County Planning & Zoning Department and Valley Soil & Water Conservation District estimates).

1. Animal Pastures

Pastures in good condition provide adequate protection from erosion by wind or water. Proper grazing systems help to prevent erosion and sediment delivery from pasturelands. Soil compaction and increases in water runoff can occur when pastures are grazed when wet. This can occur on pasturelands used as winter and spring feeding areas, on pastures grazed in early spring while soils are still wet, and on pastures grazed during or too soon after irrigation. Overgrazing can leave pastures vulnerable to erosion by wind, water, or irrigation and lead to excessive nutrient leaching or washing.

For a successful grazing program, the following management tips should be considered:

- Eliminate continuous season-long grazing; allow long rest periods or use a high-intensity, short-duration grazing system to rejuvenate poor condition pasture.
- Subdivide large pastures into smaller ones, and develop and maintain a pasture-rotation system.
- Corral livestock and feed them hay until your pasture grasses are 6" to 8" high. Move livestock when 50% of the grass plant has been eaten (3" to 4" height remains). Do not regraze until grasses are at least 6" high (will take one to three months).
- During winter months, continue your rotation to distribute manure and feed wastes evenly across your pastures or hold animals in a corral.
- Horses do not need 24-hour access to feed or forage as nutritional needs can be met with only a few hours of grazing on good pasture each day. Corral animals for a period each day to prevent overgrazing of plants and extend usage of available forage.
- Provide a water source for each pasture.
- Irrigate each pasture (if irrigated) immediately after grazing to get plants growing again. Do not graze on wet soils.

2. Riparian areas

What is a riparian area?

Riparian areas are those areas adjacent to creeks, streams, and rivers where vegetation is strongly influenced by the presence of water. By influencing the timing and quality of water produced, the condition of riparian areas can have significant economic and environmental consequences. Riparian vegetation filters out sediment which builds streambanks, forms productive wet meadows and floodplains, and reduces sedimentation of reservoirs. Riparian areas in good condition slowly release water to stream channels, thus improving seasonal water quantity and quality. They also stabilize the water table as well as water to be recharged, and assist in the beneficial recycling process of accumulated nutrients.

How does grazing relate to riparian areas?

Management of animal grazing on riparian areas for small plots of land should follow the same basic strategy as that for larger plots of public or private land. Improper animal grazing can affect the amount, timing, and quality of water in riparian areas. Improper animal grazing effects on riparian areas include loss or reduction of streamside vegetation and trampling of streambanks and channels. Channel stability is reduced and becomes more susceptible to erosion by high flows. Stream down-cutting or channelization of riparian areas will result in additional erosion and lowering of the water table. Streambank compaction can also occur and contribute to poor plant root development and decreasing the soil's infiltration rate. Improper grazing can eliminate woody vegetation which would result in decreased shade and a potential increase in stream temperatures. Streams will become wide and shallow, resulting in elevated water temperatures and will have a negative effect on cold water insects and fish.

Degraded Riparian Areas

- Little vegetation to protect and stabilize streambanks and shade stream
- Lowered water table and saturated zone, reduced subsurface water storage
- Reduction or elimination of summer streamflows
- Warmer water in summer and increased icing in winter
- Poor habitat for fish and other aquatic organisms
- Poor habitat for wildlife
- Reduced quantity and quality of livestock forage

Healthy Riparian Areas

- Diverse vegetation and root systems protect and stabilize streambanks; stream shaded
- Elevated water table and saturated zone, increased subsurface water storage
- Increased summer streamflows
- Cooler water in summer, reduced icing in winter
- Good habitat for fish and other aquatic organisms
- Good habitat for wildlife
- Increased quantity and quality of livestock forage
- Increased potential for nutrient recycling

3. Potential ground-water impacts

Poor grazing management practices often lead to slower soil infiltration rates. Decreased plant cover leaves more soil exposed to raindrop impact and soil compaction, further reducing infiltration rates. A slower infiltration rate means that more water will run off and less water will be available for plant growth, subsurface percolation, and ground-water recharge.

The potential impact on the quantity and quality of deep ground-water aquifers is low. However, grazing can impact the quality, amount, and timing of shallow ground water. In many cases, the flow of perennial and intermittent springs and streams is sustained by shallow ground-water flow. Again, poor grazing management practices can alter the amount of shallow ground-water flow and impact water quality. Decreased soil infiltration will cause increased overland and ground-water flow and can also cause a shift in plant species and increased evapotranspiration.

4. Potential surface water impacts

Most research indicates that impacts to surface water from poor grazing management practices can occur in the form of increased bacteria and nutrient concentrations and increased sediment production in the downstream portion of the watershed. It appears that coliform bacteria in streams are a function of animal density and their direct access to streams. When high bacteria levels occur, they have been found to return to acceptable levels within several stream miles.

Of the nutrients that could impact streams, nitrogen and phosphorus are of most concern. Phosphorus binds to soil organic and mineral particles and is a potential pollutant any time soil erosion rates are high. On pastures receiving commercial fertilizer, there is the potential for nutrient loss to streams, especially in areas with poor irrigation water management, poor grazing management, or soils that have a high leaching potential.

5. Riparian grazing potential solutions

Best: Use fencing to exclude livestock from the riparian area. Livestock exclusion allows riparian plants the greatest opportunity for recovery in the shortest period of time. Significant improvement is often seen in only two to three growing seasons. Even a small gap in a fence can give livestock access to water.

Good: Use fencing to allow controlled grazing of the riparian area. Avoid grazing the riparian area until streambanks are stable and well vegetated, then graze only in the late spring. Avoid early spring grazing because streambanks are saturated and vulnerable to trampling. Avoid summer and fall grazing because this is when livestock tend to overgraze shrubs, especially willows. In just a few days, livestock can remove an entire year's shrub growth. Avoid grazing riparian plants shorter than three inches.

Best management practices

Best Management Practices (BMP's) are practices or combinations of practices found to be the most effective and practicable means of preventing or reducing the amount of pollution generated by nonpoint sources. For a BMP to be practicable, it must be: technically feasible, economically feasible, and socially acceptable.

Best Management Practices that could be useful to the ranchette type operation for grazing of both pasture and riparian areas are:

- **Fencing.** Enclosing or dividing an area of land with suitable permanent structures that act as a barrier to animals, wildlife, or people. Rotational grazing can be used with properly fenced pastures. Temporary fencing can enhance grazing system.
- **Livestock exclusion.** Excluding animals from an area not intended for grazing. Fencing is an excellent way to exclude animals from riparian areas. The width of area fenced should be carefully planned.

- **Nutrient management.** Managing the amount, form, placement, and timing of applications of plant nutrients. Performed properly, nutrient inputs to streams from fertilizer applications can be substantially reduced.
- **Pasture management.** Proper treatment and use of pasture. Planning the use and fertilization of pastures helps focus other practices towards water quality goals.
- **Planned grazing system.** A practice where two or more grazing units are alternately grazed. This could be useful where separation of pastures will continue to improve forage.
- **Pond.** Embankment or excavated ponds that are used to water animals. Small constructed ponds are valuable as sources of water when stream access is prevented to provide riparian area protection.
- **Proper grazing use.** Grazing at an intensity that will maintain enough cover to protect soil and maintain or improve vegetation quality and quantity. This can be used in conjunction with separation of pastures.
- **Water development.** Improving springs and seeps by excavating, cleaning, capping, or providing collection and storage facilities. Also includes wells and pipelines in order to place water where desired. When springs are located on the property, they can become an excellent source of stock water. This can be part of a riparian protection plan.
- **Channel vegetation.** Establishing and maintaining adequate plants on streambanks, berms, spoil, and associated areas. This is an excellent way to improve riparian condition. It should be used with other measures, such as, animal exclusion or rest.
- **Critical area planting.** Planting vegetation, such as, trees, shrubs, vines, and grasses or legumes on highly erodible or critically eroding areas. This practice is an excellent way to reduce sediment runoff from any problem area. It should be used with other measures, such as, animal exclusion or rest.
- **Ephemeral watercourse planting.** Using adapted plant species and double seeding techniques to reduce the formation of ephemeral gullies. When used in combination with small rock structures, this can be very effective at reducing erosion.
- **Fish stream improvement.** Improving a stream to create new fish habitat or enhance existing habitat (will require a stream alteration permit from the Corps of Engineers). When used in conjunction with other riparian area protection methods, a ranchette can have both grazing and a natural environment with an improved instream fishery.
- **Heavy use area protection.** Protecting heavily used areas by establishing plant cover, surfacing, or structures. This is an excellent way to prevent erosion from high traffic areas, such as, animal stream crossings.
- **Streambank and shoreline protection.** Using vegetation or structures to stabilize and protect banks of streams against scour and erosion (may require a stream channel alteration permit). When suitable riparian protection is initiated, streambank improvements are very effective.
- **Wetland development and restoration.** The construction or restoration of a wetland facility to provide the hydrological and biological benefits of a wetland. Establishing or improving wetlands is an excellent way to improve riparian areas and raise water tables to be utilized by forage plants.
- **Salting.** Salt blocks are useful for controlling animal distribution. Placing salt away from watering locations will help reduce time spent near water.

Summary

Utilizing grazing management strategies and improving pasture and riparian areas must not be identified as beneficial only to water quality, fish, or wildlife. Virtually all of these practices mentioned above result in some type of improvement in forage or water table levels which translates into improved productivity over the long term. Ranchette owners concerned with water quality as well as increased productivity should seek the proper technical assistance for the implementation of a plan to improve forage production, riparian areas, and animal watering capabilities.

Proper management of both pasture and riparian areas can benefit your property in the following ways:

- Creates diverse vegetation and root systems which protect and stabilize streambanks and lessens the likelihood of flooding.
- Elevates water table and saturated zone and increases subsurface water storage which will lessen the need for irrigation.
- Reduces stream channel icing in winter and decreases the chances of spring flooding.
- Improves aesthetic values and related property values.
- Increases quantity and quality of animal forage.
- Reduces soil erosion and off-site sediment delivery.
- Reduces the risk of both surface and ground-water contamination.

Worksheet 12

Pasture and Riparian Management (small ranchette-type operation)

1. Use a pencil. You may want to make changes.
2. For each category listed on the left that is appropriate to your homestead, read across to the right and **circle** the statement that **best** describes conditions on your homestead (skip and leave blank any categories that don't apply to your homestead).

3. Then look above the description you circled to find your "rank number" (4, 3, 2, or 1) and enter that number in the blank under "your rank."
4. Complete the section "What do I do with these rankings?"
5. Allow about 15-30 minutes to complete the worksheet and summarize your risk rankings for pasture and riparian area management practices.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
RIPARIAN AREA MANAGEMENT (Addressed in Fact/Worksheet 12, Section 1-5)					

Streambank condition

More than 90% of the streambanks are stable with plant cover or large rocks. Little or no active erosion.

70-90% of the streambanks are stable with plant cover or large rocks. Some active erosion.

Less than 70% of the streambanks are stable with plant cover or large rocks. Active erosion very evident.

Livestock access to stream

Stream fenced to exclude livestock.

Limited livestock access to stream.

Livestock have unlimited access to stream.

Streamside (riparian) vegetation

Stream well shaded with trees and/or shrubs. Perennial plants dominate with few or no annual plants.

Trees and/or shrubs providing some shade. Perennial plants dominate with some annual plants.

Little or no shade provided by trees and/or shrubs. Perennial or annual plants may dominate.

Streamside (riparian) vegetation trend

Streamside tree and/or shrub seedlings present and growing well.

Streamside tree and/or shrub seedlings present but not growing well.

Streamside tree and/or shrub seedlings not present.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
PASTURE MANAGEMENT (<i>Addressed in Fact/Worksheet 12, Section 1</i>)					
Grazing management	Two or more pastures used in rotation to allow plant rest. Grazing period begins at a 6" leaf length and ends at 3". Plant height at least 3" going into winter.	Pasture(s) not allowed rest, but grazing period begins at a 6" leaf length and ends with at least 3". Plant height at least 3" going into winter.	Two or more pastures used in rotation to allow plant rest but grazing period begins at less than a 6" leaf length and/or plants grazed shorter than 3". Plant height less than 3" going into winter.	Pasture(s) not allowed rest. Grazing period begins at less than a 6" leaf length and/or plants grazed shorter than 3". Plant height less than 3" going into winter.	_____
Plant Health	Forage plants are healthy with dark green leaves, deep roots, and vigorous regrowth. Very few weeds. High production.	_____	Forage plants somewhat unhealthy. Plant production beginning to decrease. Weeds increasing.	Forage plants are unhealthy and may have yellowish colored leaves, shallow roots, small size, or slow regrowth. Weeds common. Low production.	_____
Heavy use area(s) (corrals, troughs, or salt areas with little or no protective plant cover)	Heavy use area(s) established well away from stream or irrigation ditch.	Heavy use area(s) established near stream or irrigation ditch, but runoff is diverted and/or captured.	Heavy use area(s) near stream or irrigation ditch and runoff is not diverted or captured.	Heavy use area(s) located adjacent to stream or irrigation ditch.	_____
Irrigation (Complete only if irrigated)	Sprinkler irrigated with little runoff, OR surface irrigated with no stream in or adjacent to pasture, OR surface irrigated with tailwater captured.	Surface irrigated with 20' wide or greater buffer of ungrazed vegetation along the stream.	_____	Surface irrigated with no buffer along the stream; tailwater is not captured.	_____
Fertilizers	Fertilizers applied based on soil test or Extension guidelines and manure scattered with harrow, OR fertilizer not used and manure scattered.	Fertilizer applied based on soil test or Extension guidelines and manure not scattered, OR fertilizer used and manure not scattered.	Fertilizer applied without soil test or Extension guidelines, but manure is scattered.	Fertilizer applied without soil test or extension guidelines and manure is not scattered.	_____

What do I do with these rankings?

Step 1: In the table below, summarize your risk scores by choosing the appropriate box for each category, and answered on the worksheet.

Pasture and Riparian Management Risk Rankings Summary

CATEGORY	Risk Rank			
	Low 4	3	2	High 1
Streambank condition				
Livestock				
Streamside (riparian) vegetation				
Streamside (riparian) vegetation trend				
Grazing management				
Plant Health				
Heavy use areas (corrals, stream crossings, et cetera)				
Irrigation				
Fertilizers				

Step 2: Look over your rankings for individual activities.

High Risk Practices (1) Pose a high risk for your health and for contaminating both surface and ground water.

Moderate to High Risk Practices (2) Are inadequate protection in many circumstances for both surface and ground water.

Low to Moderate Risk Practices (3) Provide reasonable surface and ground-water protection.

Low Risk Practices (4) Are ideal; try to make this your goal.

Any shaded rankings require immediate attention. Some concerns you can take care of right away; others could be major or costly projects, requiring planning and prioritizing before you take action. The long term goal of the Home*A*Syst program is to improve homestead practices and structures so that they are classified as low risk. Activities classified as low risk generally reflect best management practices.

Transfer any activities that you ranked in the shaded areas in step 1 to the "High-Risk Activities" on pages two, three, and four of Worksheet B.

Step 3: Read the materials provided in this document. If you haven't already, consider how you might modify your homestead practices to better protect your drinking water.

Contacts and References

Who to Call About...

Technical standards and design assistance

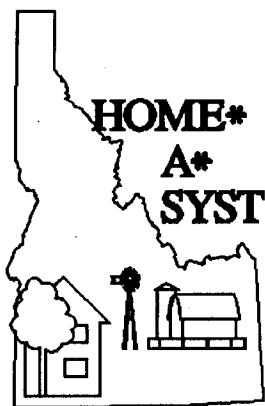
- Your local Soil Conservation District (SCD)
- Natural Resources Conservation Service (NRCS)
- Idaho Soil Conservation Commission (SCC)

Sources of Information about Financial Assistance

- Your county Farm Service Agency (FSA)
- Your local SCD
- NRCS
- Cooperative Extension System office (CES)
- Idaho Department of Fish and Game
- U.S. Fish and Wildlife Service (Acres for Wildlife)

References

- Clary, Warren R.; Webster, Bert F. 1990. Riparian Grazing Guidelines for the Intermountain Region, Rangelands 12(4).
- Clary, Warren R.; Webster, Bert F. 1989. Managing Grazing of Riparian Areas in the Intermountain Region. Gen. Tech. Rept. INT-263. Ogden, UT.: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.
- Livestock Grazing on Western Riparian Areas
- Idaho Agricultural Pollution Abatement Plan
- NRCS -- Field Office Technical Guide (Section IV)



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Information derived from **Home*A*Syst** worksheets is intended only to provide general information and recommendations to rural residents regarding their own homestead practices. All results are confidential.

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